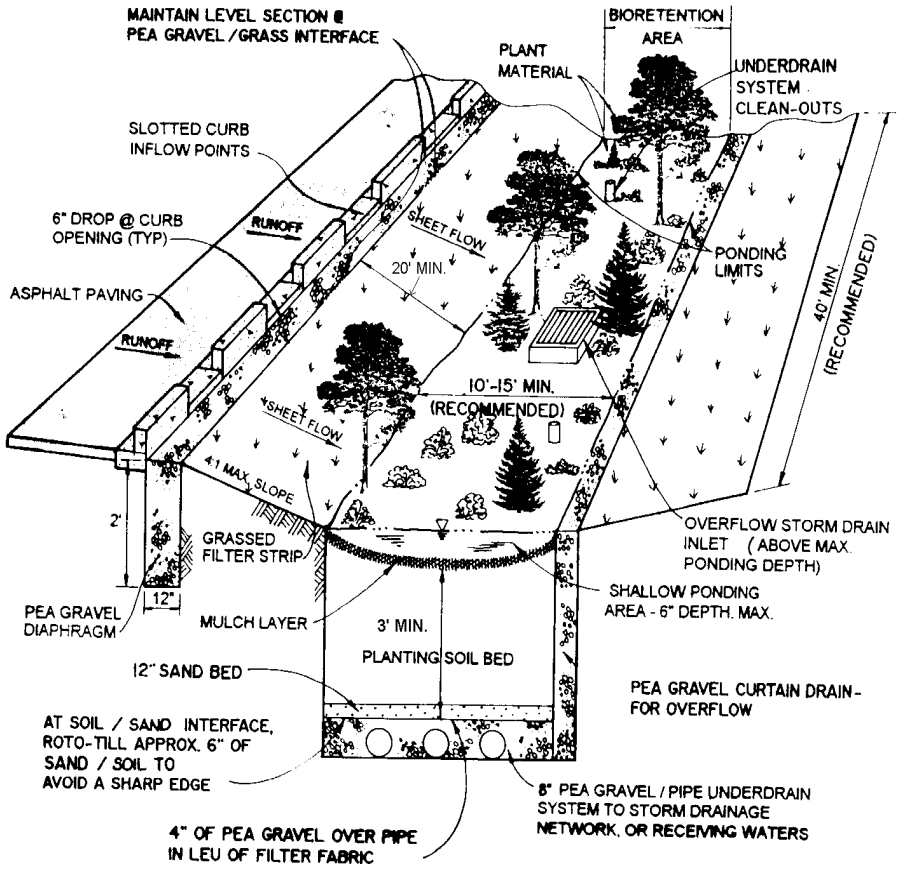
Appendix 1.

Control Measures for Stormwater Runoff and Infiltration

1. Bioretention Area

Bioretention areas generally consist of sand, gravel and soil mixtures supporting a surface vegetated with grasses, shrubs, and trees. Runoff flows to these areas from pavement, tees, or greens, and is filtered before collection at the bottom in subsurface conduits. The filtered effluent is then released to adjacent surface waters.

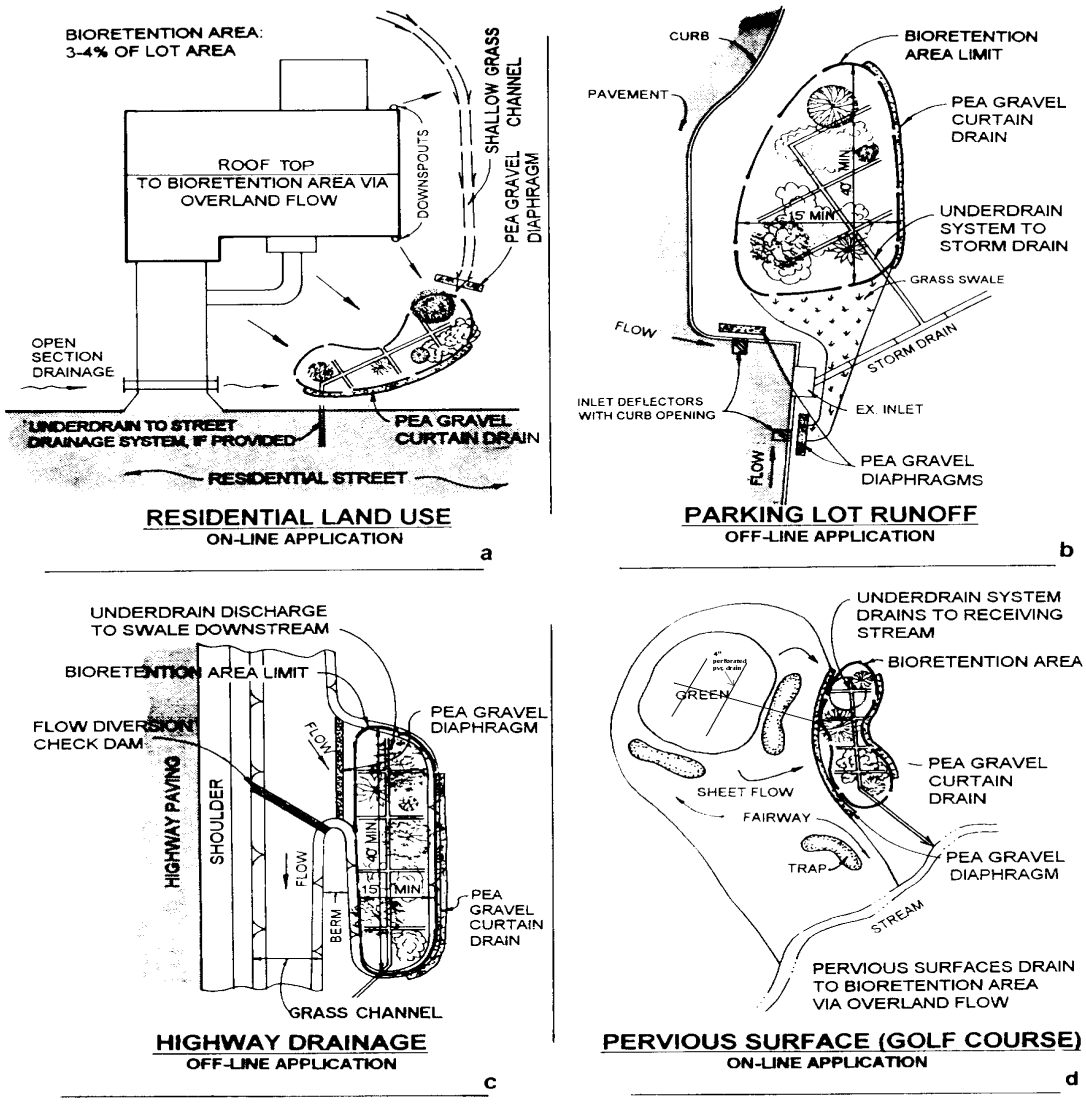


SOURCE: Adapted from Prince George's County, Maryland Design Manual, 1993

Source: Claytor and Schueler, 1996

2. Site-Specialized Bioretention Systems

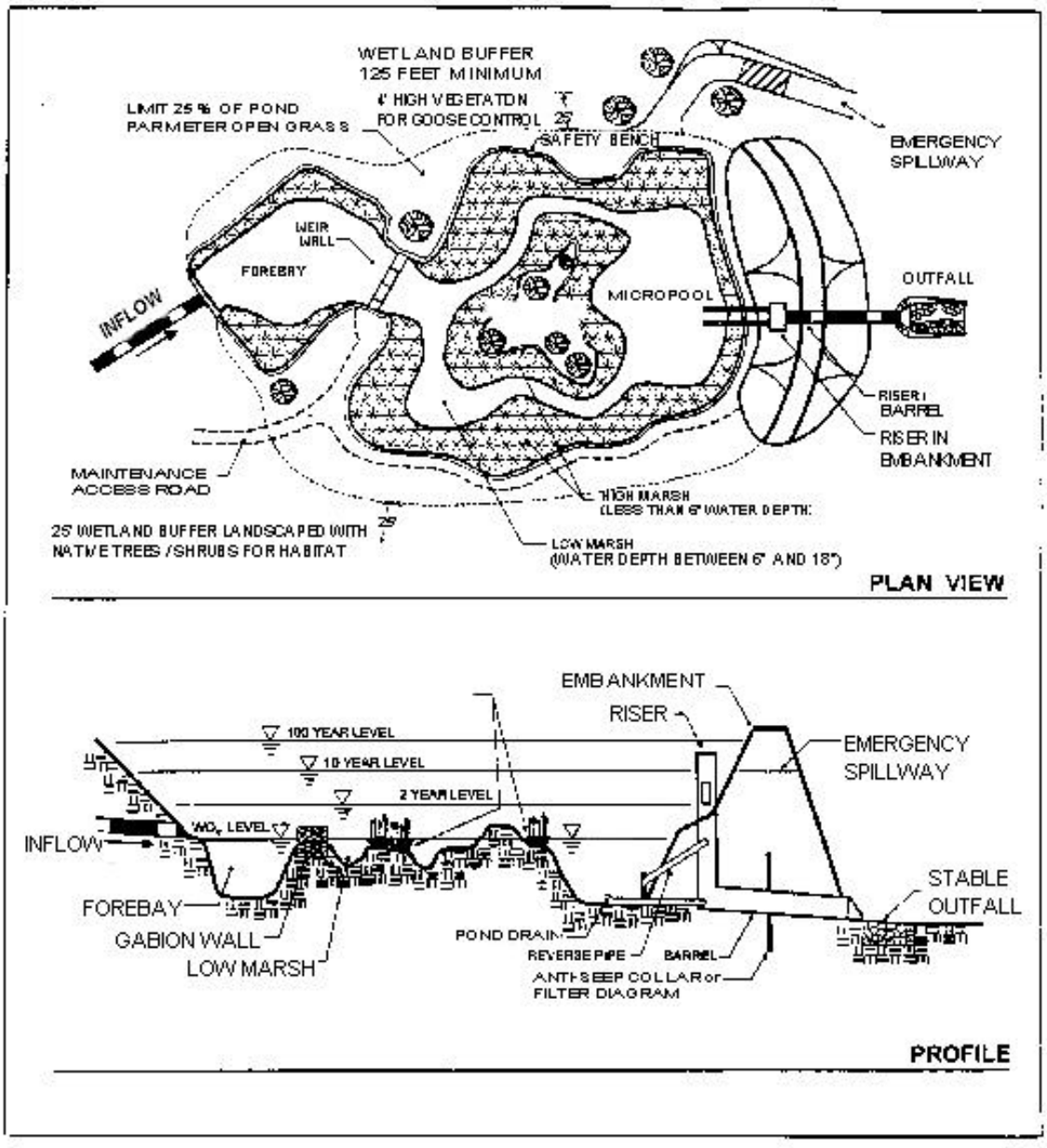
These specialized bioretention systems are designed to collect leachate and direct it to a layer of vegetation, organic matter, sand, and stone. The water then either infiltrates into the soil or is piped to a forest buffer for further treatment. The system for tees and greens, lower right, is especially useful for monitoring of leachate.



Source: Claytor and Schueler, 1996

3. Constructed Stormwater Wetlands

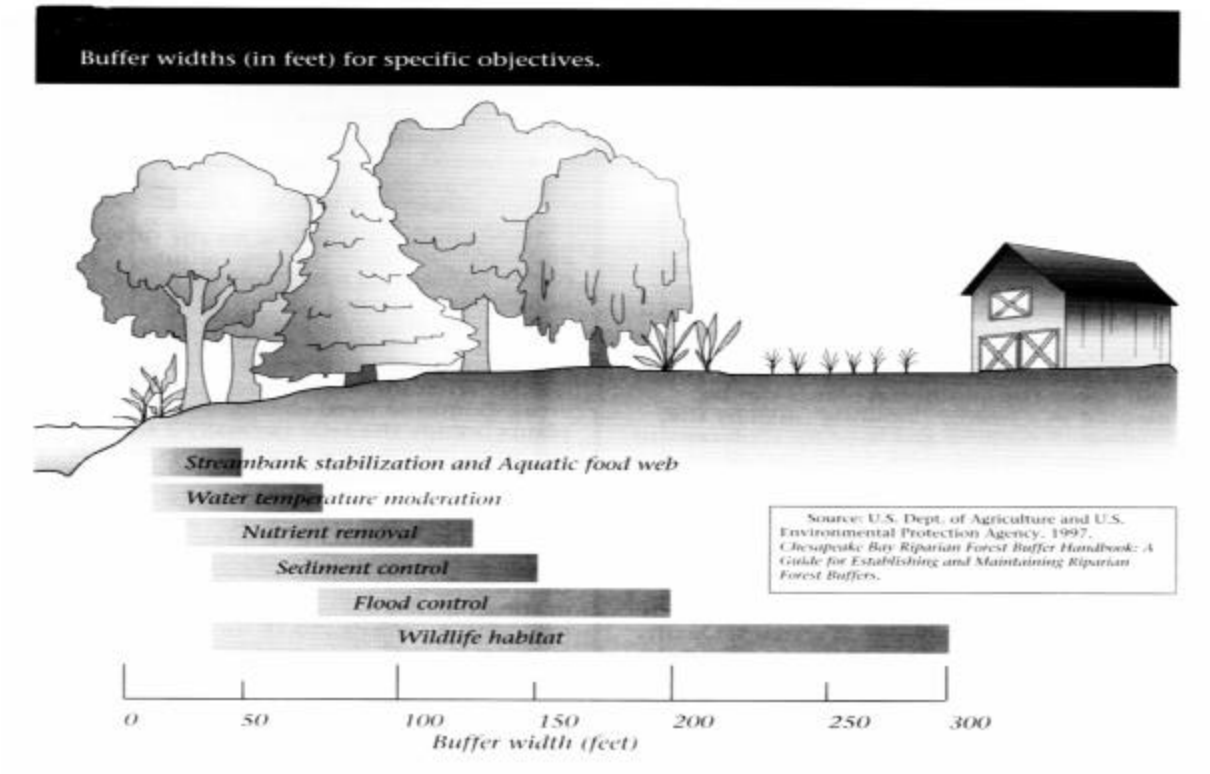
Constructed wetlands are shallow basins designed to have areas of open water, marshland, and transitional shoreline. Wetland vegetation such as cattail, sedges, and rushes are established. Runoff from larger areas is directed into the artificial facility for removal of a wide variety of pollutants. Constructed wetlands can be incorporated into a stormwater detention/retention facility.

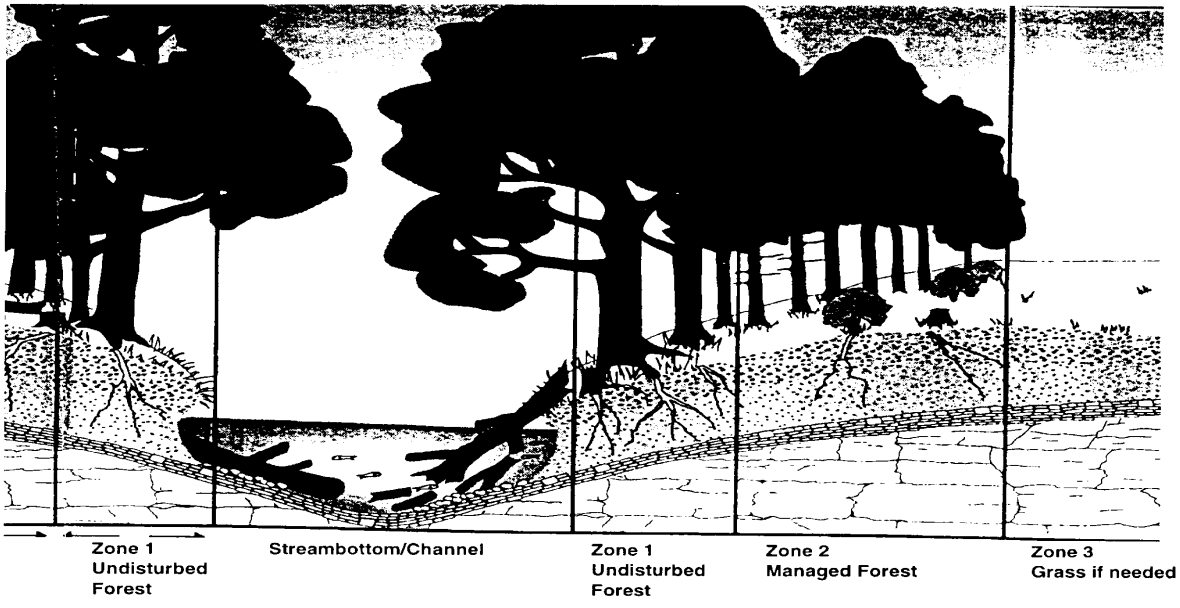


Source: State of Maryland Dept. of Environment, 1998

4. Filter Strip / Riparian Forest Buffer Strip

These strips are areas thickly vegetated with native grasses, shrubs, and trees adjacent to surface waters. Widths generally range from 35 to 300 feet. Pollutants are reduced as runoff flows through the strips. These areas also provide valuable wildlife habitat.



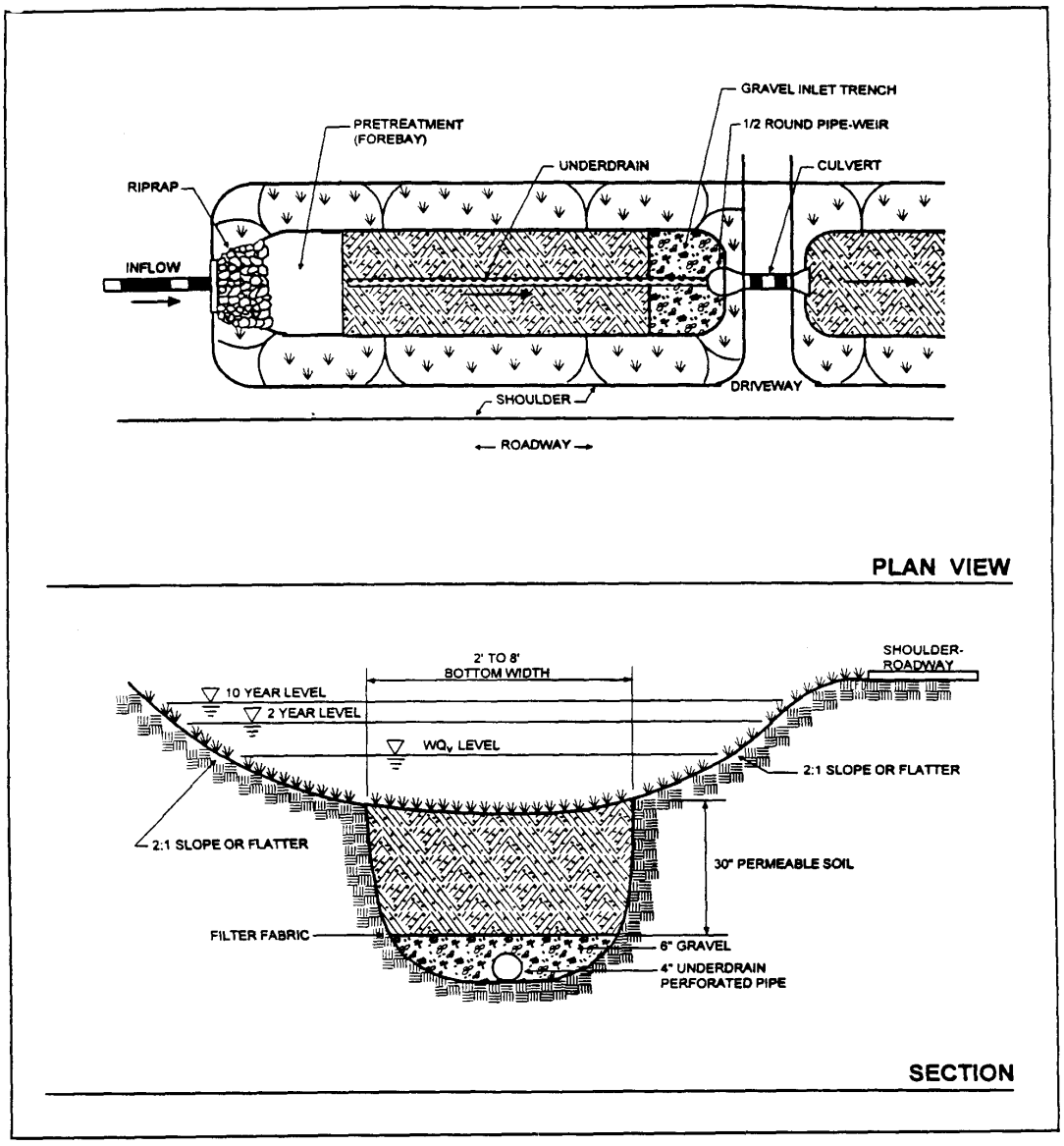


3-Zone buffer for riparian forest buffer.

Sources: University of Maryland 1998 (top); Pennsylvania DEP 1997

5. Enhanced Grass Swale

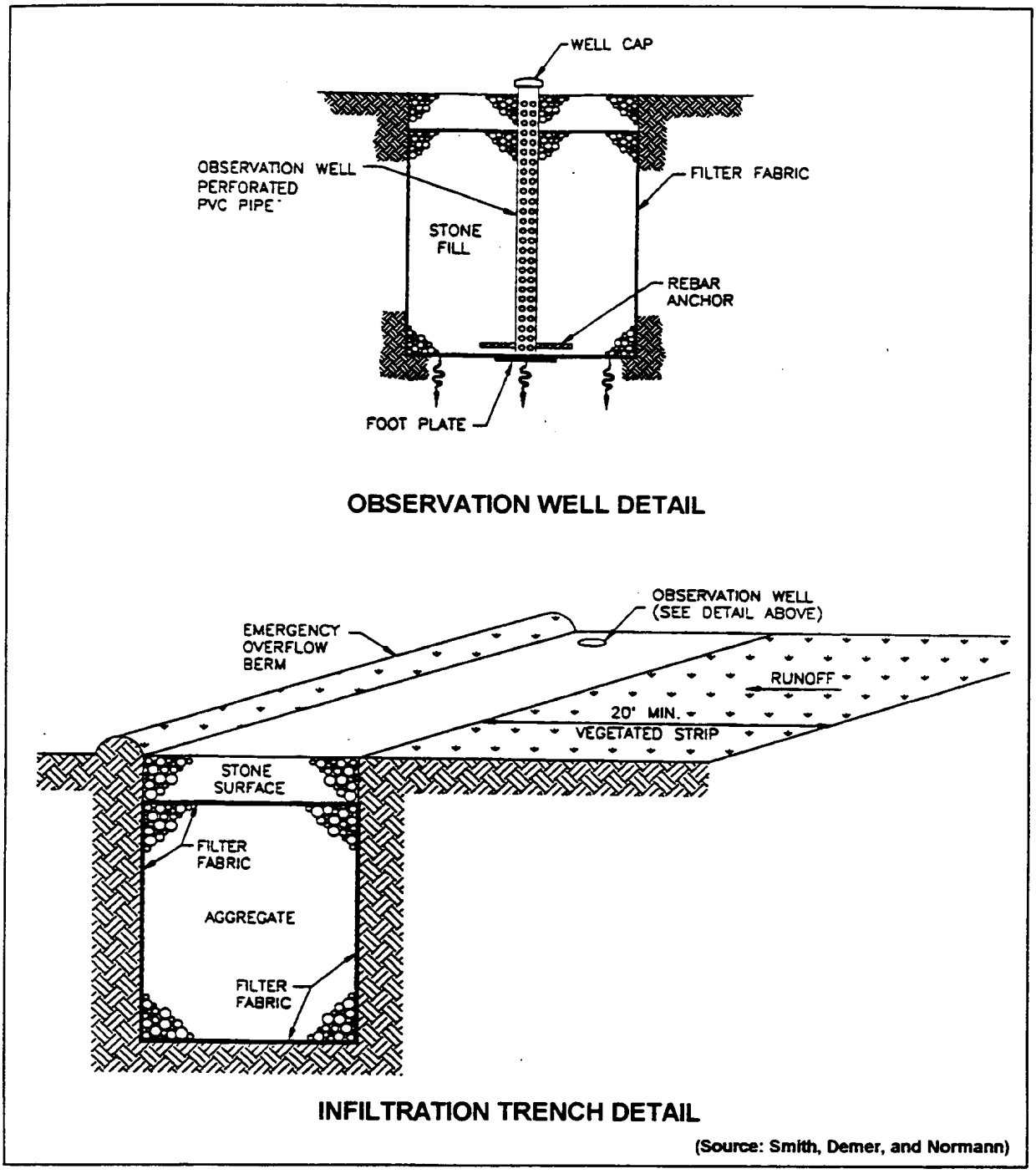
Grass swales are vegetated stormwater conveyance channels providing moderate pollution removal. The filtering capability is enhanced by the pretreatment settlement area and a filtration medium beneath the channel. Pollutant removal can be enhanced by placing gravel berms across the channel at moderate intervals.



Source: Claytor and Schueler, 1996

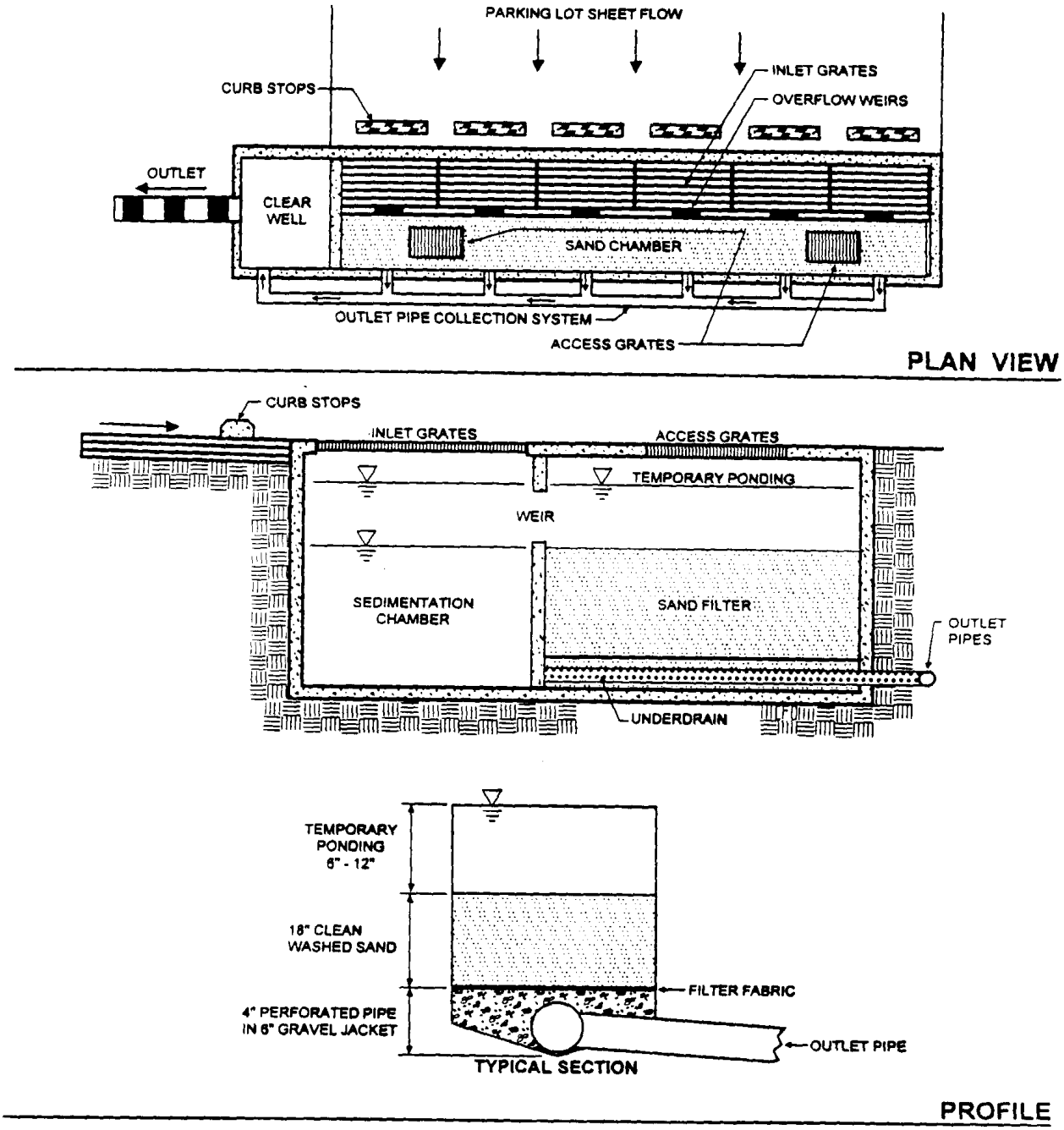
6. Infiltration Trench

Infiltration trenches are stone and sand filled excavations that receive runoff from areas of 5 acres or less. Stormwater seeps through the stone, sand, is slightly filtered, and then released to the water table. These trenches are not applicable in 'hotspots' receiving runoff potentially containing pollutants from pesticide loading, fuelling, or vehicle maintenance.



7. Sand Filter

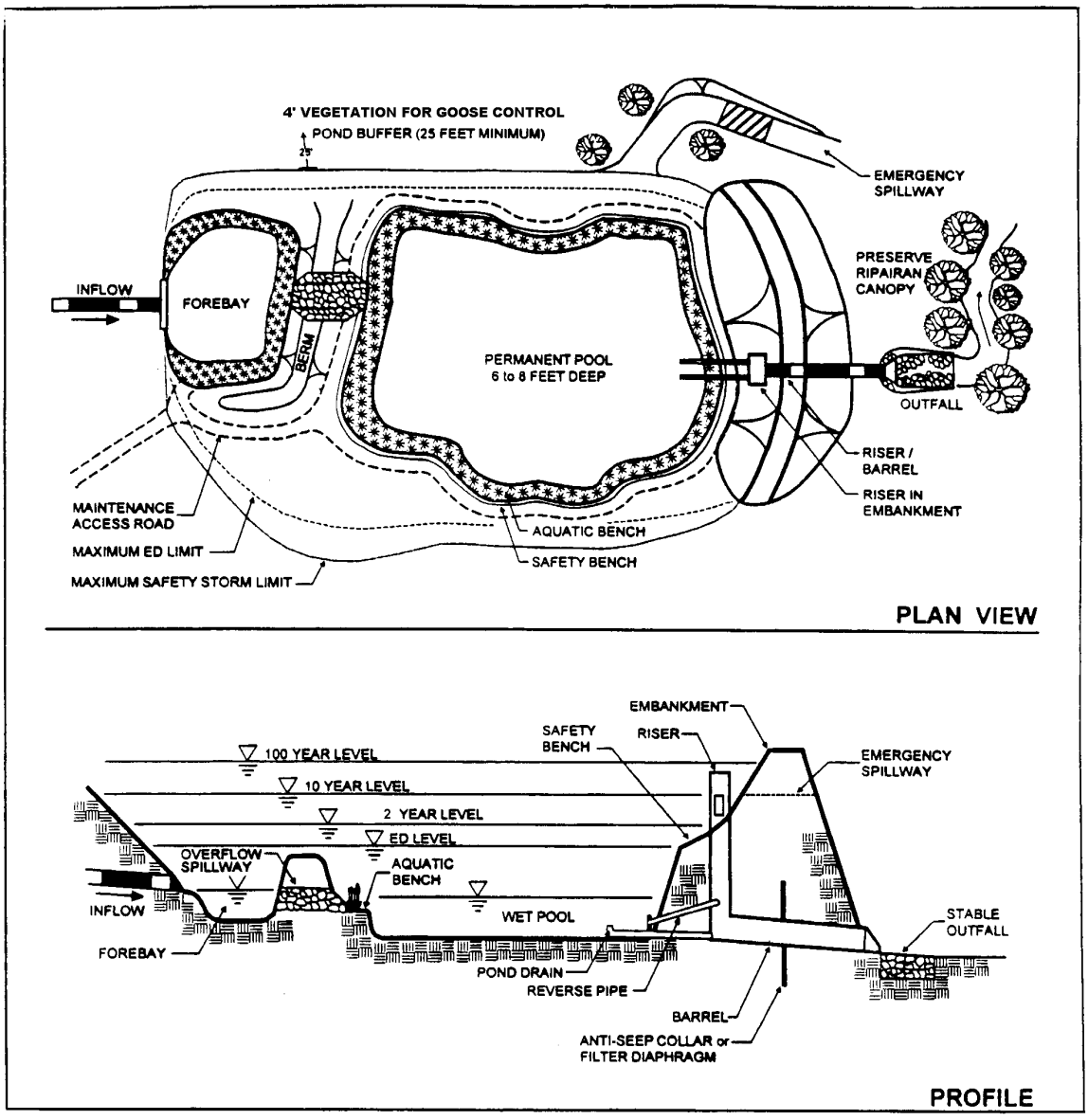
Sand filters consist of either open beds or long catchbasins with a filtering layer of sand. Stormwater runoff is directed to the sand bed, percolates down through, and is collected at the bottom in conduits for release to adjacent surface waters.



Source: State of Maryland Dept. of Environment, 1998

8. Wet Pond

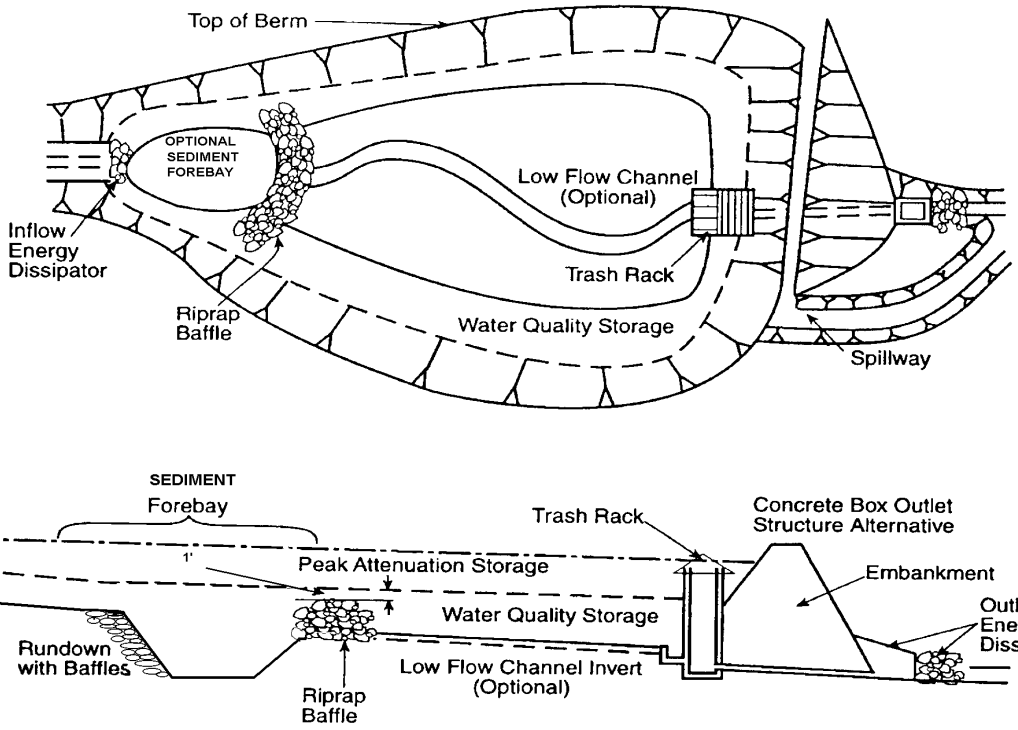
A wet pond is a stormwater management facility which consists of a permanent pool for enhancing water quality and additional capacity above the pool elevation for stormwater detention and controlled release.
It is an integral part of the golf course.



Source: State of Maryland Dept. of Environment, 1998

9. Extended Detention Basin

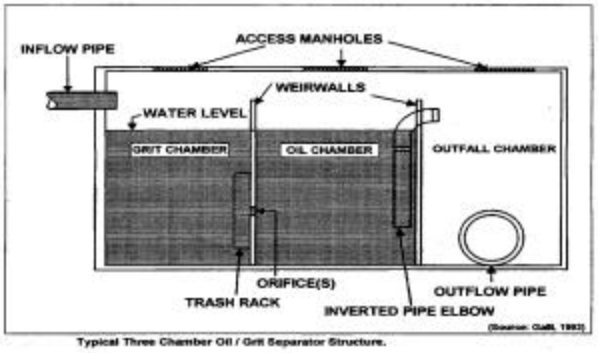
These runoff management structures are designed to hold back the design storm and release runoff slowly through a controlled orifice. Water quality improvement is slight to moderate - these are primarily for water quantity control.



(Adapted from *Dam Design and Construction Standards*, Fairfax County, Virginia, 1991)

10. Manufactured Treatment Devices

These devices are manufactured by several companies, and have a variety of pollutant removal components integral to their function. Primary component processes can include filtration, settlement, and oil/grease separation. Below is one very simple example of this technology.



Source: State of Maine, 1995